MITSUBISHI

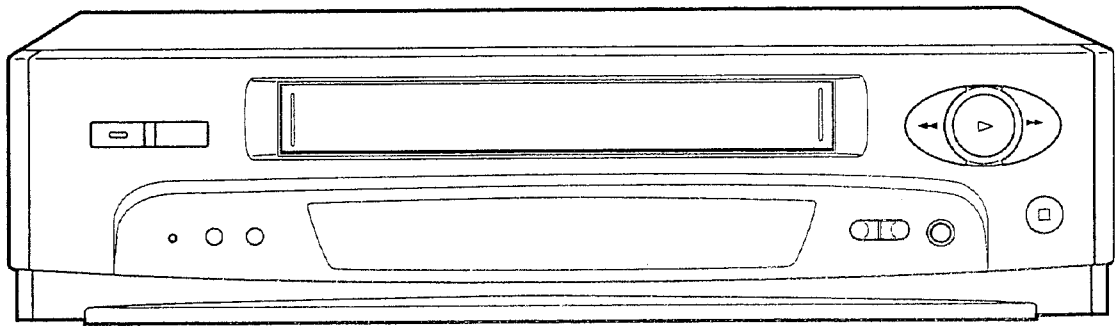
VIDEO CASSETTE RECORDER

User's Guide

MODEL

HS-651V(E)

ENGLISH



SHOWVIEW

VHS Hi-Fi STEREO

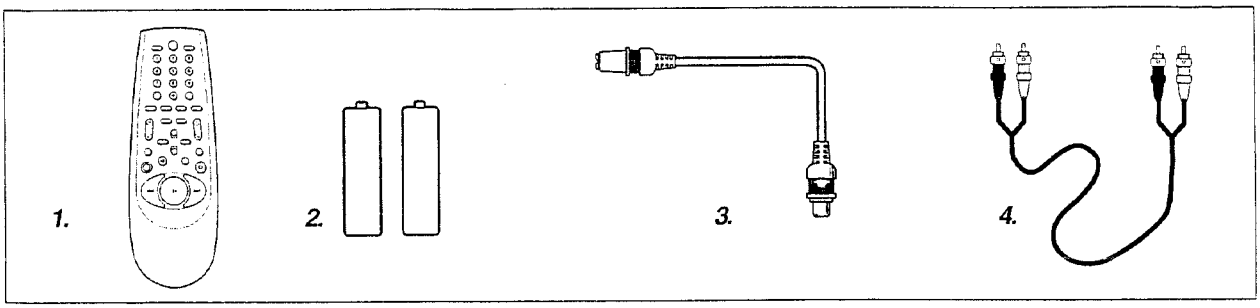
PAL

THIS VIDEO CASSETTE RECORDER IS BASED ON THE VHS FORMAT. ONLY VIDEO CASSETTE TAPES MARKED VHS MAY BE USED WITH THIS MODEL.

THIS INSTRUCTION MANUAL IS IMPORTANT TO YOU. PLEASE READ IT BEFORE USING YOUR VIDEO CASSETTE RECORDER.

Before setting up

Before setting up, make sure that the following items are at hand: 1. Remote control, 2. batteries, 3. coaxial cable, 4. Hi-Fi leads. If any of these items are missing, please contact your dealer. Dispose of the packing materials safely.



Safe use of this VCR

Before you choose a place for your VCR, please note the following:

Never allow this appliance to be exposed to rain or moisture (danger of shorting and electric shock), or in a workshop (problem of dust, vibration or magnetic disturbance). Keep the VCR away from heat sources (radiators or direct sunlight) and air conditioning equipment.

Do not obstruct the air vents by covering the VCR. Do not install the VCR in a confined space. If you are installing the VCR into a bookcase or built in cabinet make sure there is sufficient air circulation. Overheating will cause damage and shorten the life of this VCR. Place on a solid, vibration free surface.

Avoid large variations in temperature and dampness. Condensation may ruin the tapes and tape transport. Should the VCR be subject to a wide temperature change on installation, switch the VCR to ON but do not operate the VCR for about two hours. The VCR will gradually warm up, and disperse any condensation.

Do not place heavy objects such as a television on top of the VCR. The casing may become warped. Do not touch the inside of the VCR or insert any foreign objects of any kind. Foreign bodies can damage the VCR considerably.

Never place containers of liquid on the VCR (e.g. vases of flowers or drinks). Liquid spillage can lead to fire, electric shock or shorting.

Please ensure that all electrical connections (including the mains plug, extension leads and interconnections between pieces of equipment) are in accordance with the manufacturer's instructions. Always withdraw the mains plug when making or changing connections.

A damaged mains lead is a potential fire or shock hazard. When unplugging your VCR, pull it out of the socket by means of the plug (not the lead). Ensure the lead is not in contact with the appliance surface for long periods. When going away for a long period of time always disconnect the VCR from the mains and remove the aerial lead.

When you finish operating your VCR always unload the cassette and turn off the VCR's POWER. Remember the VCR will still be connected to the mains voltage when the POWER is turned off.

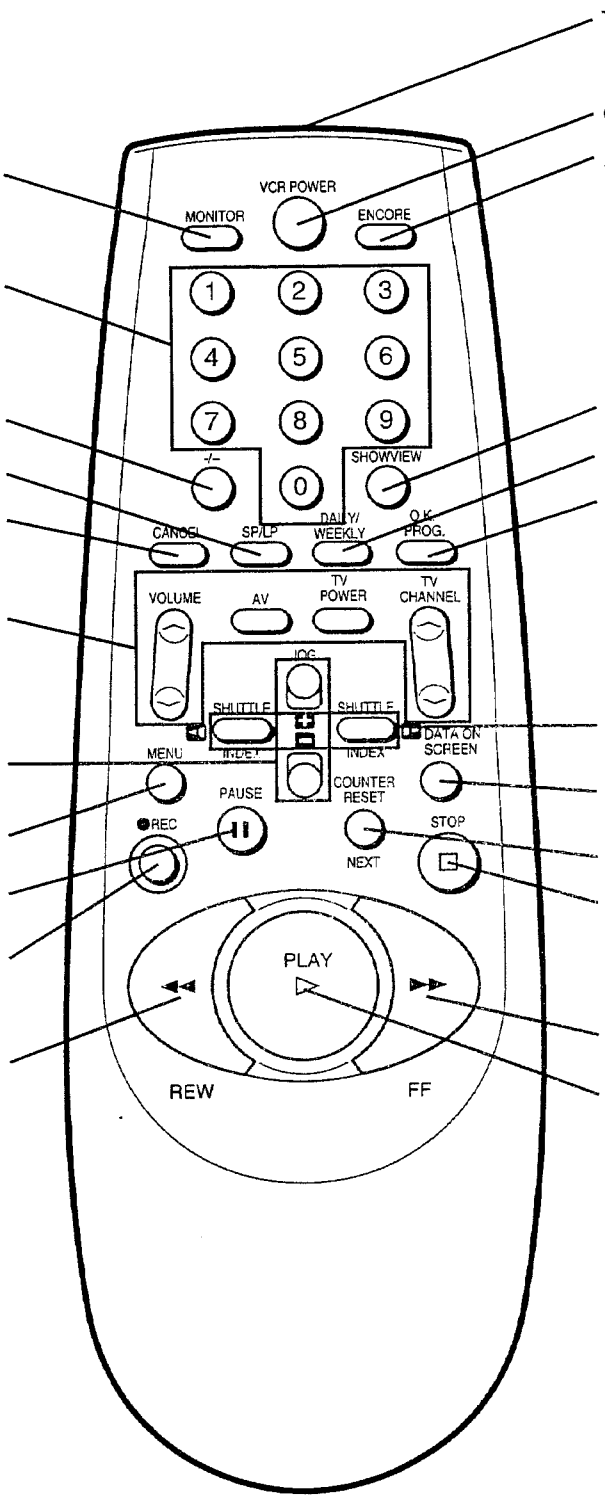
Wipe the VCR with a soft, dry, clean cloth or a clean cloth slightly moistened with a mild detergent. If you are ever in doubt about the installation, operation or safety of your equipment, contact your dealer.

If you are in any doubt about the VCR working normally, or if it is damaged in any way - switch off, withdraw the mains plug and consult your dealer. Never remove any fixed cover as this may expose dangerous voltages.

Do not leave equipment switched on when it is unattended unless it is specifically stated that it is designed for unattended operation or has a stand-by mode. For switching the equipment off, special arrangements may need to be made for infirm or handicapped people.

REMOTE CONTROL UNIT

To have in each situation the most important functions in view, below we have a short description of the functions. Detailed information regarding these functions can be obtained within the relevant chapters.



ENGLISH

Overview of functions

Though the VCR has many features we have made an effort to try to bring to you a clear understanding of the VCR and a user friendly remote control by putting programming menus and less regular used functions onto an on screen menu. The use of these menus is eased by a colour coded guide and the on screen information.

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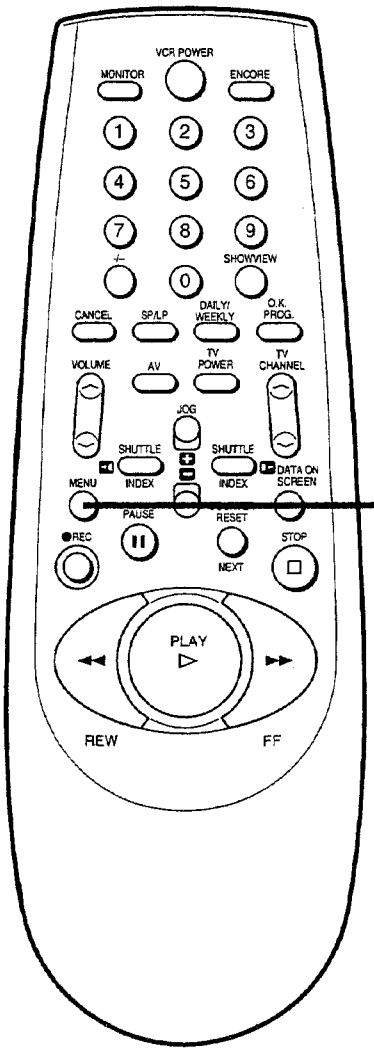
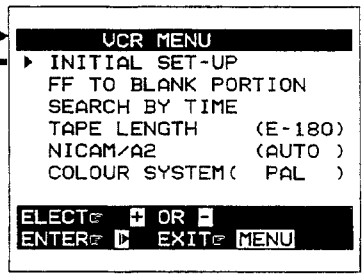
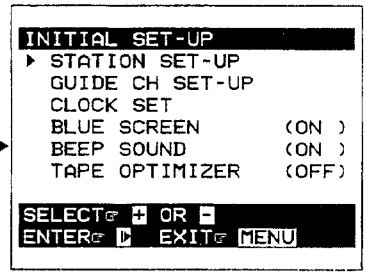


MENU button

One press of the MENU button.



Select the desired item with the JOG + orJOG - buttons and then press the SHUTTLE ▷ for the new display to appear.



You can quit a menu at any time by pressing the MENU button.

If by chance your remote control is not available or it is faulty, you will still be able to make timer programming as follows:

1. Press the O.K.PROG. button on the VCR to enter the programming menu.

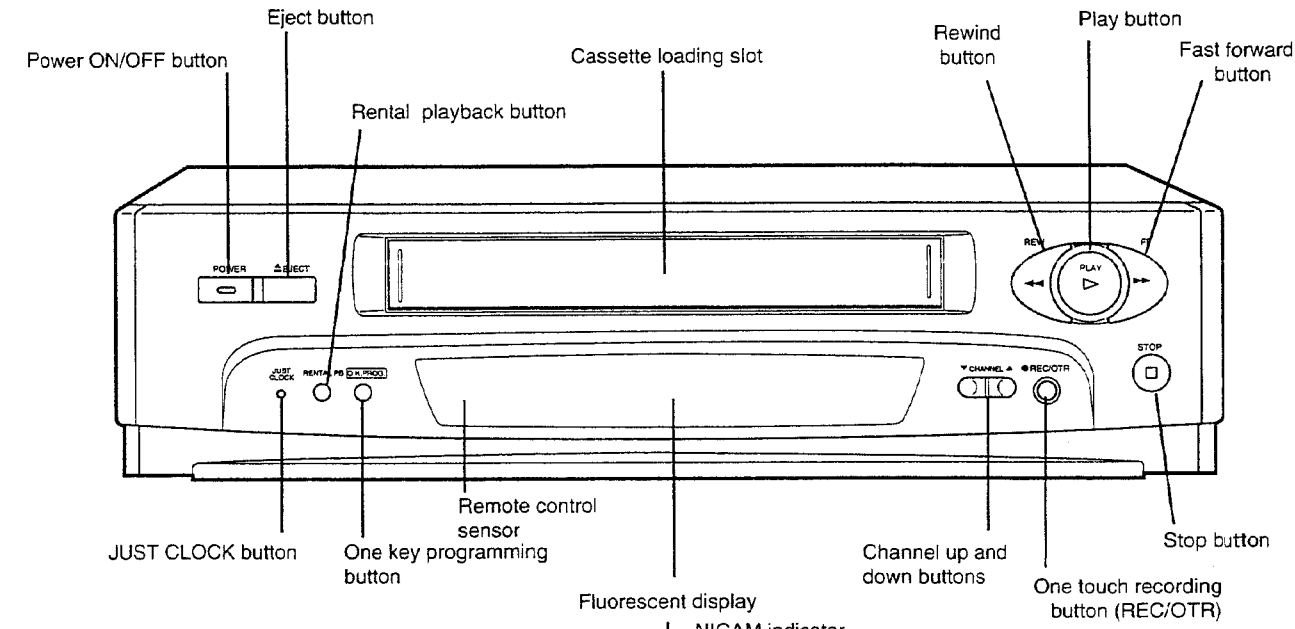
2. Enter every step of programming data by pressing the O.K.PROG. button when the cursor flashes at the selected item. Release the O.K.PROG. button when your input is completed and the cursor will move to the next position after 4 seconds.

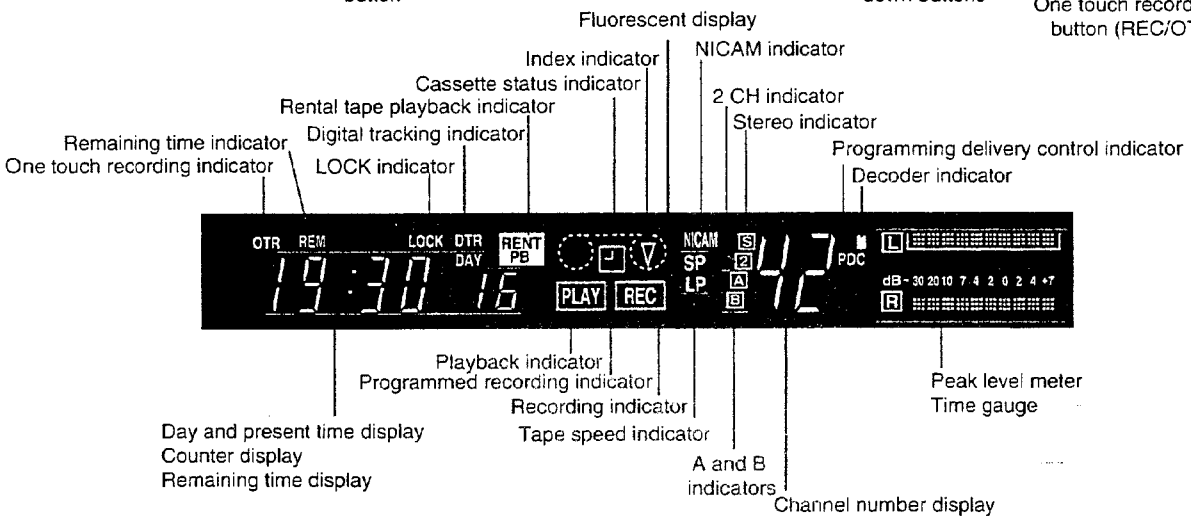
3. When you have completed inputting all your data, set the "CONFIRM" to YES and the VCR will automatically switch to stand-by mode for programming.

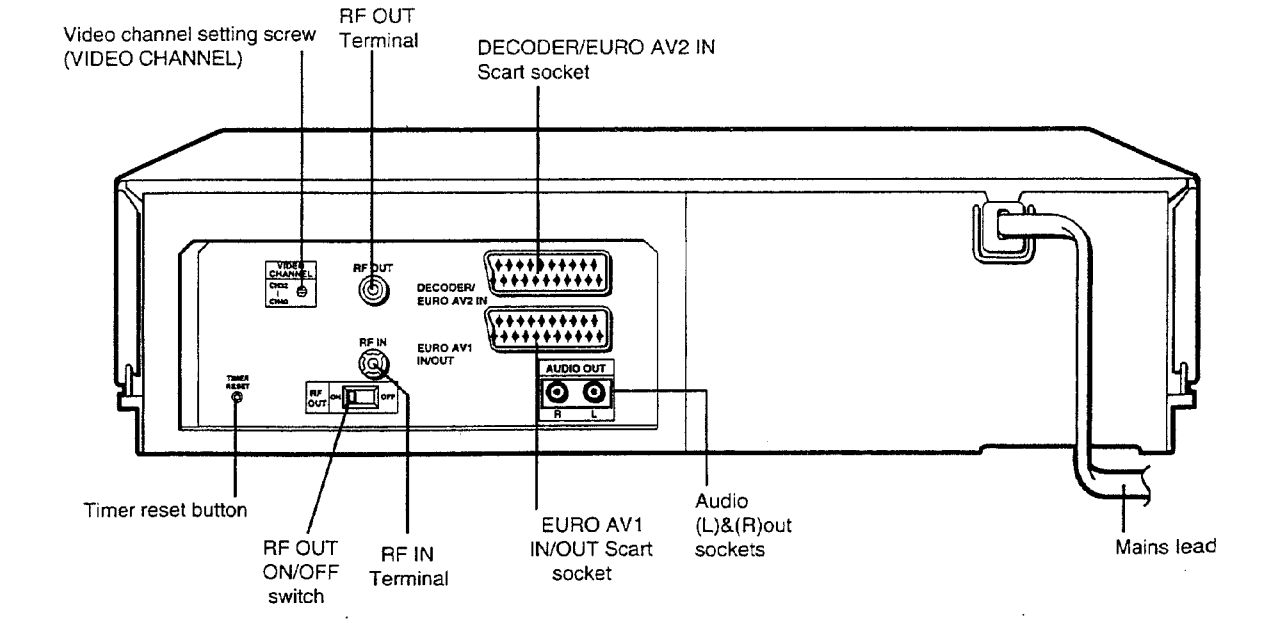
4. If you want to leave the programming menu without entering all your data, press the POWER button on the VCR.

VIDEO RECORDER

Controls and displays







Introduction

Congratulations...

on purchasing a Mitsubishi Video cassette recorder. You have acquired a top product from Mitsubishi. In addition to a wide range of functions and convincing picture and sound technology, this appliance also offers the new function 'ShowView', which enables you to programme recordings just by entering a maximum of nine digits (see 'ShowView programming').

We wish you much enjoyment with your new Mitsubishi VCR.

Layout of the guide

When you use this guide, unfold the front flaps so that you will gain an overview of the component parts.

This guide is arranged as follows:

Chapter I explains how to connect up the VCR and prepare it for use. Chapter II provides an overview of all the tape functions and Chapter III demonstrates how to record. Chapter IV shows how to playback. Chapter V describes further facilities your VCR possesses. In the event of any problems and faults please refer to Chapter VI before contacting your service department.

There is a key words index in Chapter VII and a listing of the technical data in Chapter VIII. In addition this manual contains a short description of the remote control, the on screen menus and an explanation of the buttons and displays (see front flaps).

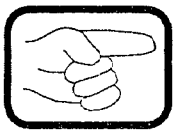
By studying this you will find clear, important information on how to use your new VCR.

Explanation of the advisory signs

In this user manual we are operating with the following signs to draw your attention.

WARNING!

If this sign appears next to the text, please observe the warning carefully in order to avoid serious faults.



N.B.!

This sign indicates further facilities and helps prevent misuse.

ShowView is a trademark applied for by Gemstar Development Corp. ShowView system is manufactured under licence from Gemstar Development Corporation.

Caution:Unauthorised recording of TV programmes or other materials may infringe the right of copyright owners and be contrary to copyright laws.

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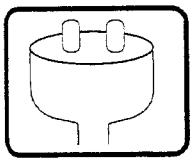
Design and specifications are subject to change without notice. (Printing mistakes, errors and technical changes are reserved.)

This Video Cassette Recorder complies with the requirements of the EC Directive 89/336/EEC, "EMC Directive" and 73/23/EEC, "Low Voltage Directive", as amended by Directive 93/68/EEC. The requirements for the susceptibility according to EN 55020 and the requirements for interference according EN 55013 are observed for the operation on residential areas, business and in small scale enterprises, inside as well as outside of the building. All places of operation are characterized by their connection to the low voltage power supply system.

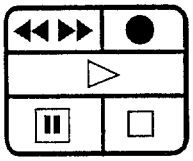
Your attention is drawn to the warning notice on the rear of the VCR. Do not remove the top cover as there is a risk of electric shock.

Contents



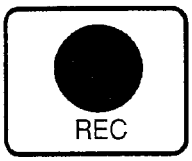
Installation and connection

Connecting the VCR to an aerial, mains and TV 8
Connecting the VCR to other appliances (if required) 8
Inserting the batteries in the remote control 9
Setting up the video channel on the TV 9
Choosing the language 10
Setting and fine tuning channels 10, 11
Setting for ShowView Programming 12
Setting the clock, clock control 13



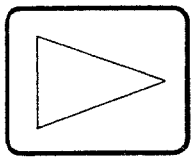
Basic functions

Recording off air 14
Playback 15
Picture search 15
Still pictures 15
Frame advance 15
Winding on and rewinding 15
Automatic rewind mechanism 15
Colour coordinated displays and buttons 15



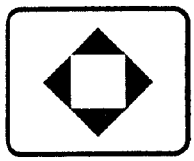
Recording

Record button 16
Tape speed 16
Recording one programme whilst watching another 16
PDC programming 16
External appliances 16
One touch recording (REC/OTR) 17
One key programming (O.K.PROG.) 17, 18
ShowView programming 18, 19
Regular recording 19
Programming 8 recordings 19
Automatic recording speed (AT) 20
Recording coded TV programmes 20
Hi-Fi stereo recording 20



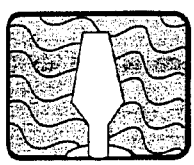
Playback

On screen display 21
Tape length setting 21
Playing from marked positions (Index signals) 21
Erasing index signals 21
Forward to blank space and stop 22
Time search 22
Replay function 22
NTSC playback (on PAL TV) 22



Advanced features

Tape optimizer 23
Rental tape playback 23
Beep sound 23
Parental lock (LOCK) 24
Memory backup in case of power failure 24
Automatic digital tracking (DTR) 24
Switching to other colour systems 24
Blue background 24
Quick look 24
Copying with two VCR's 25
Editing control 25
Stereo and dual soundtracks 26
Soundtrack indicators 26
Soundtrack selection 26
Continuity between recordings 26



Troubleshooting

Troubleshooting 27

ENGLISH

Installation and connection

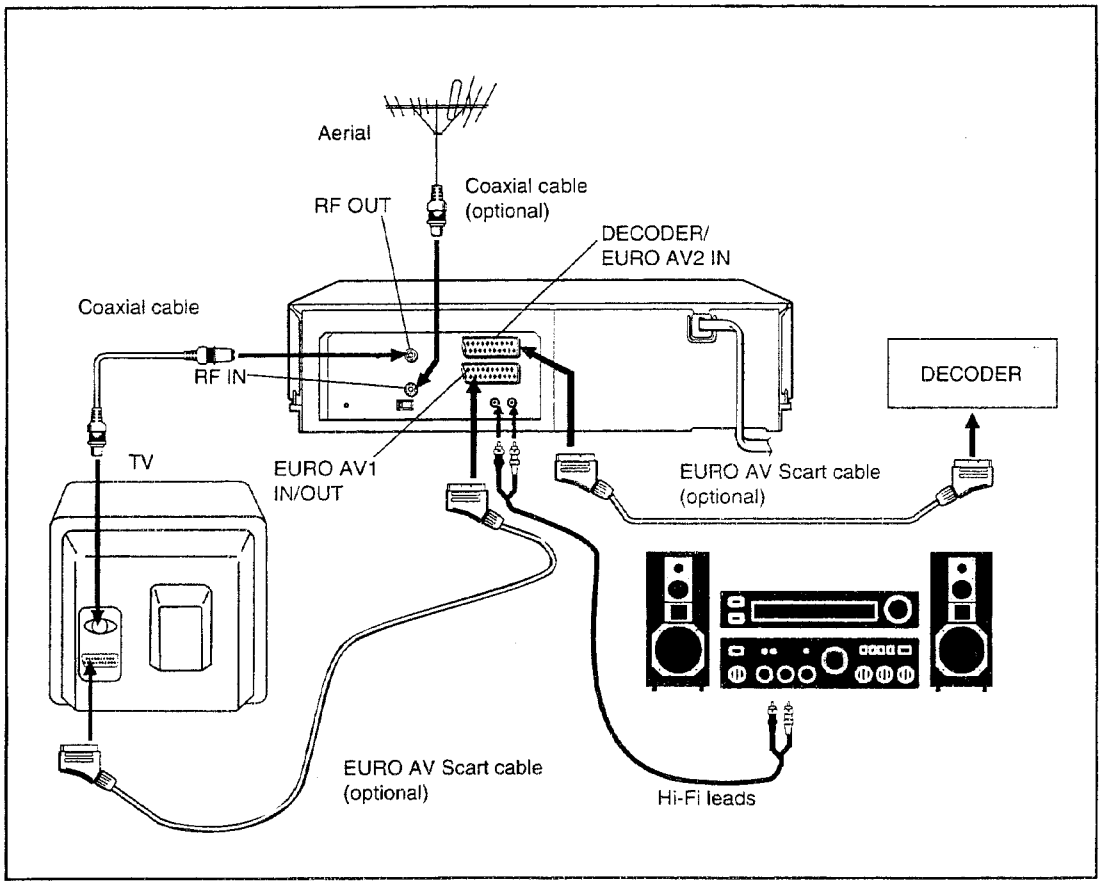
■ Connecting the VCR to an aerial, mains and TV

When you have chosen a suitable place, proceed as follows:

1. Plug in the aerial lead to the RF IN socket on the VCR and connect the coaxial cable (supplied) from the RF OUT socket on the VCR to the aerial socket on the TV.

2. Your TV and VCR can now be connected to thev mains supply.

Tip: If your TV or monitor has a Scart connection, you can connect a Scart lead to the VCR Scart socket. This will result in an improved picture quality. (To obtain a Scart cable, contact your dealer.)



■ Connecting the VCR to other appliances (if required)

By selecting an external channel L1 or L2, you can utilise the Euro AV scart sockets on the rear of this VCR. For example, L1 selects the EURO AV1 IN/OUT socket and L2 selects the DECODER/EURO AV2 IN socket.

If you wish, you can connect other appliances such as a Camcorder, Hi-Fi, Satellite receiver or a PAY TV decoder to your VCR. To do this you will need a cable with at least one Scart plug. The plug at the other end of the cable will plug into the other appliance. As the VCR has two Scart sockets, it can be connected to two appliances simultaneously, (e.g. Pay TV Decoder and TV).

To select an external channel (L1 or L2), press the JOG ■ button on the remote control.

The external channels are linked to the following AV connectors:

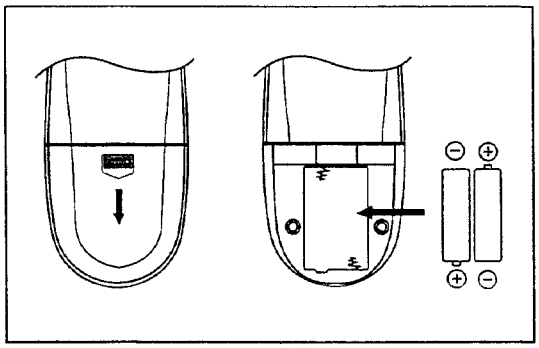
L1=EURO AV1 IN/OUT scart socket

L2=DECODER/EURO AV2 IN scart socket

Installation and connection

■ Inserting the batteries in the remote control

Place the batteries in the remote control. Observe the polarities (see diagram on the right). If you have a Mitsubishi TV, you can also control the most important TV functions with the same remote control.
Please regard the remote control as the command HQ of your VCR.



The operating distance for the remote control is up to 7 metres.

Dispose of any old batteries carefully. Do not heat, disassemble, short or throw them in a fire. Make sure they do not fall into the hands of children. They are highly toxic!

The batteries should always be changed as a pair.

■ Setting up the video channel on the TV

A free channel must be kept on your TV for watching recordings. Tune in the video channel as follows:

Tip: If you are using a Scart cable, set the RF OUT switch to OFF. In this case, there is no need to select the video channel on your TV but you must select the AV channel on the TV. You can ignore the following settings which applies to customers who are not employing a Scart cable.

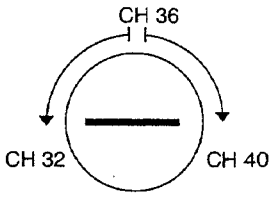
1. Turn on the VCR by means of the blue POWER button on the remote control.
2. Turn on the TV.
3. Press the MENU button on the remote control.
4. Choose a free channel on the TV and tune it to UHF channel 36. Follow the instructions for the TV. The VCR has been set to UHF channel 36. A language menu should appear on the screen (see next page).

Should the video channel encounter interference from another source, or infringes upon another channel, this will be apparent through snow, colour distortion or blurred print in the menu. In this case, it must be fine adjusted. Proceed as follows:

1. Choose a free channel in the range UHF 32 to 40. Follow the instructions for your TV.
2. Slowly and carefully turn the adjusting screw on the rear of the VCR with a suitable screwdriver until the language menu appears on the TV, completely clear.

If you have a TV which has to be manually tuned, you must adjust the Adjusting screw on the rear of the VCR first, then set your TV to the video channel and start the tuning search.

Adjusting screw

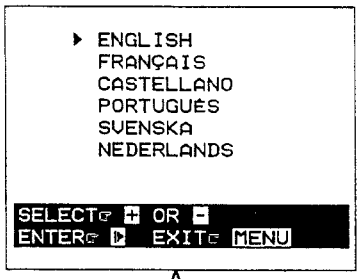


ENGLISH

Installation and connection

■ Choosing the language

The menu which appears on the TV screen offers you six languages to choose between. (If the language menu does not appear, press the MENU button.) Press the JOG ▬ or JOG ✚ until the white arrow (Cursor) points to the desired language. Then press the SHUTTLE ▶ button. The VCR menu will then appear in the language chosen. Press the MENU key to quit.



As you see here, comprehensive menus are supplied with hints. \Each time they outline briefly the next selection. For your convenience, the remote buttons are colour coded in correspondence with the on screen menus.

If you choose the wrong language, press the TIMER RESET button on the rear of the VCR with a pointed instrument. The VCR will then return to its original state.

ENGLISH

■ Setting and fine tuning channels

After connecting the aerial to the VCR and the VCR to the TV, follow the instructions below.

The following functions can only be carried out with the remote control unit.

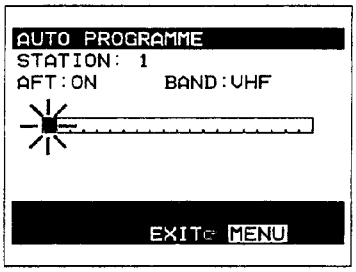
Please ensure your VCR is not set to external channel L1 or L2.

A. Programming stations automatically

Your VCR will automatically tune in the television stations, allowing you to dispose unwanted or unused stations:

1. On the INITIAL SET-UP menu choose STATION SET-UP, as described on front flaps. The words "AUTO PROGRAMME" will flash.

2. Press the PLAY button. The auto programme menu appears and activates channel presetting.



When the channel presetting ends, the TV screen will display the STATION SET-UP menu.

3. Press the MENU button to quit the STATION SET-UP display.

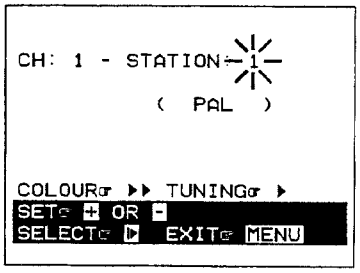
B. Rearranging your stations

After programming in your stations, you may find that you are not satisfied with the positioning. To change the stations positioning, proceed as follows:

1. Choose STATION SET-UP menu from the INITIAL SET-UP menu.

2. Press the SHUTTLE ▶ button. The number after "CH" will flash. Change it with the JOG buttons orthe number keys.

3. Press the SHUTTLE ▶ button. The station number will flash. Change it by means of the JOG buttons or the number keys, until the station you want to store appears.



4. Repeat steps 2 and 3 for other channels.

5. Press the MENU butt on to store all the rearranged channels.

If you are receiving a SECAM programme, you can change the colour system by pressing the FF key when the station number is flashing. (PAL, SECAM or PAL D). If you are tuning in a PAY-TV station and you have an appropriate decoder connected, ensure the colour system is set to PAL D. (A "d" will appear on the right side of the channel display on the TV screen.)

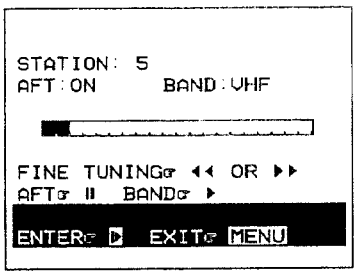
C. Fine tuning stations

The VCR is equipped with Automatic fine tuning (AFT), which normally provides the best possible reception quality, if the station is weak, manual fine tuning may be necessary. Proceed as follows:

1. Choose STATION SET-UP menu from the INITIAL SET-UP menu.

2. Press the SHUTTLE button. The number after "CH" will flash. Select the channel to be fine tuned by pressing the JOG buttons or the number keys and then press the SHUTTLE button.

3. Press the PLAY button.



4. Displayed on screen is AFT:ON. Switch the AFT to OFF by pressing the PAUSE button.

5. You can tune the channel by using the FF and REW buttons.

6. Press the MENU button to quit from this function.

Stations not already stored in the channel list can be tuned in and stored. In step 4, turn the AFT:OFF to ON. If you want to change the band from UHF to VHF, press the PLAY button.

If a channel is very noisy (snow on the screen) the VCR reverts to a "blue background" (see 'Advanced features - Blue background' on page 24).

D. Skipping vacant channels

Up to 60 channels can be stored. If not all channels are in use (i.e. noisy or weak stations) these can be skipped so that they are not selected by means of the JOG buttons.

Proceed as follows:

1. Choose STATION SET-UP menu from the INITIAL SET-UP menu.

2. Press the SHUTTLE button and then select the channel to be skipped by pressing the JOG buttons, e.g. 11.

3. Press the STOP button. SKIP:ON will appear.

4. Repeat steps 2 and 3 to skip further stations.

5. Press the MENU button to quit from this function.

If you change from channel to channel by means of the JOG buttons, you will find:.....8, 9, 10, 12, 13.

You can also select channels with the numeric keys. If you choose a two-digit programme, you must first press the key "-/--".

ENGLISH

Installation and connection

■ Setting for ShowView Programming

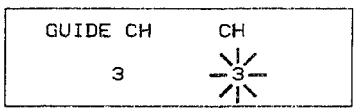
The ShowView programming System allows you to programme without having to enter a channel, Date, Start and End time. By simply entering a 9 digit number called a ShowView number, which can be found printed in several TV magazines beneath the regular programming details, your programme is automatically set into the VCR for you. (If the ShowView numbers are not currently available in your area, they will probably be introduced soon.)

However, before using this system, you have to allocate a specific ShowView Guide Channel Number to each of your presetted programmes in the VCR. The Guide Channel Numbers do not necessarily match the number you personally have selected for your programmes. With this allocation of numbers, you inform the ShowView System of the channel you have the related stations memorised into.

To input the ShowView guide channel numbers, proceed as follows:

1. On the INITIAL SET-UP menu choose GUIDE CH SET-UP.

2. The 3 digits below GUIDE CH are flashing. Enter using the number keys the ShowView Guide Channel Number. (Input must be made with 3 digits.)



3. Next the 2 digits below CH are flashing. Enter the channel number where you want the Guide Channel Number to be allocated to.
Input must be of 2 digits;
Example:
Guide Channel No.107 (EUROSPORT)=CH 01
Guide Channel No.109 (MTV)=CH 05

4. Press the SHUTTLE button to return to the 3 digit GUIDE CH display. You can now continue as described in steps 2 and 3 to input the Guide Channel Numbers and allocate them to your actual selection of Programme placing.

5. Press the MENU button to quit.

If you wish to record a Satellite programme via the ShowView programming function, then you will have to input in the CH the AV connection according to where your Satellite receiver is connected to:

e.g. L1 EURO AV1 IN/OUT
L2 DECODER/EURO AV2 IN

Use the JOG buttons to input L1 or L2. (The sequence of channels is 3, 2, 1, L2, L1, 60...)

Ensure that for programmed recording, the Satellite receiver is a) switched on and b) the desired programme's channel selected on the Satellite receiver.

The ShowView Guide Channel Numbers can be found in your local TV magazines. Any changes or modifications to the ShowView Guide Channel Numbers may happen.

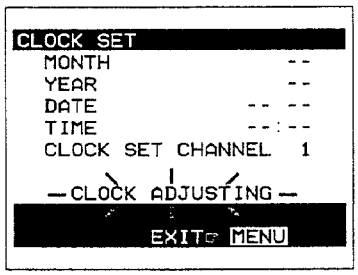
ENGLISH

■ Setting the clock, clock control

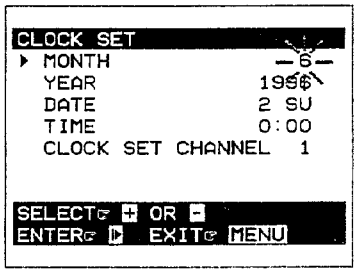
The clock will be automatically set after the JUST CLOCK function is utilised. To set the VCR to the correct time and date, proceed as follows:

1. Turn on the VCR and turn to the video channel on your TV.

2. Press the JUST CLOCK button on the VCR. (The CLOCK SET display appears on the TV screen.)



The clock and the date display will be set to the correct time according to the station which is tuned into CH1.



3. Press the MENU button to quit the CLOCK SET display and to activate the clock.

The VCR must be tuned in your stations before clock setting.

The CLOCK SET CHANNEL is used for the daily automatic control of the VCR's clock. The function will be factory preset to Channel 1.

The VCR checks the clock daily and corrects, if necessary, at 11:00 o'clock. The VCR must be on stand-by mode for this function to work.

If the reception signal is weak or cannot be recognised, the clock may not be set correctly. In such a case, enter another channel. To do this, proceed as follows:

1. Press the SHUTTLE ◘ button until the CLOCK SET CHANNEL display flashes. By pressing the JOG buttons you can enter a new channel for the clock control.

2. Press the MENU button to quit this function.

Depending on the area, the JUST CLOCK function may not work correctly. In this case set the time and date manually. Press the SHUTTLE buttons to move the flashing area and you can adjust the settings by pressing the JOG buttons.

To be able to view the clock after you have completed clock setting, switch the VCR off.

If the clock is still being set incorrectly even after entering a new channel. You can prevent the clock from being checked daily by setting the CLOCK SET CHANNEL to "- -".

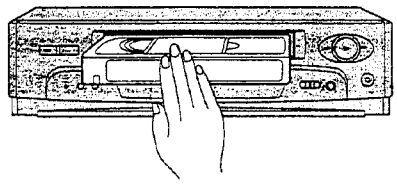
ENGLISH

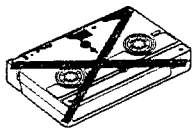
Basic functions

This chapter provides information about the basic functions of this Mitsubishi VCR. When you have read this chapter you will be able to record and playback programmes. All relevant tape functions are described here.

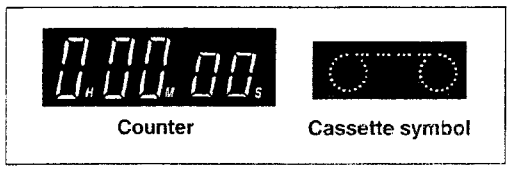
■ Before you insert a cassette into the VCR, note the following:

Insert the cassette as shown in the picture. Do not force the cassette into the loading slot; at a certain point the cassette will be drawn in automatically.





When you have inserted the cassette correctly the cassette symbol will light up on the display and the counter will show 0H00M00S.

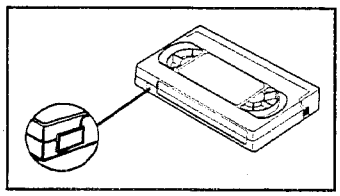


Only use cassettes marked VHS.

Never attempt to repair a torn tape and reuse it. You may damage the video heads.

Treat the video cassettes with care. Do not place them near magnetic fields (such as loud speakers), as the recording may be damaged. Protect from dust and the sun.

You can protect recordings from being accidentally erased by breaking off the protective tab.



Your VCR has a built in head cleaner that will automatically clean the recording/playback heads when a tape is inserted. It may happen after extensive use, that the heads need to be cleaned manually. In such a case, contact your dealer.

■ Recording off air

A comprehensive guide to recording is to be found in the chapter "Recording". Here we will limit ourselves to describe the simplest and quickest methods.

Proceed as follows:

1. Select the Video channel on your TV so that you can watch the programme being recorded.

2. Insert a cassette. The screen will show briefly the message "CASSETTE IN".

Make sure the protective tab has not been broken off, otherwise the VCR will start by playing back.

3. On the VCR choose the channel you want to record by means of the number keys or the JOG buttons.

4. Press the REC button.

5. End the recording by pressing the STOP button.

You can stop and start the recording at any time by means of the PAUSE button (e.g. during commercial breaks).
Note that after five minutes on record pause mode, the VCR will resume recording. This avoids possible damage to the tape.

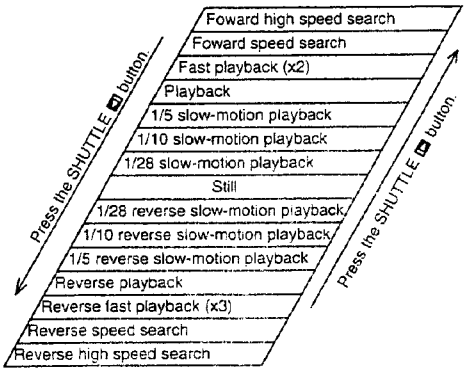
Basic functions

■ Playback

Rewind the tape with the REW button. If necessary change the colour system (see chapter 'Advanced features' and 'Switching to other colour systems' on page 24). Now press the PLAY button. You can stop the tape at any time with the STOP button and remove the tape by pressing the EJECT button.

■ Picture search

You can alter the playing speed by activating the SHUTTLE buttons while playing a tape: pressing the SHUTTLE ▶▶ button increments the forward search speed. Pressing the SHUTTLE ◀◀ button increments the reverse search speed.



In still picture, the FF and REW buttons, on the VCR, operate the same as the SHUTTLE buttons on the remote control. Pressing the FF button is the same as pressing the SHUTTLE ▶▶ button and pressing the REW button is the same as pressing the SHUTTLE ◀◀ button.

■ Still pictures

If you press the PAUSE button while playing, you will obtain a still picture. If the picture has a jitter, you can correct it by pressing the CHANNEL ▲ or ▼ button on the VCR until the jittering improves.

Side to side vibrations cannot be adjusted with still adjustment.

■ Frame advance

In pause mode, repeated pressing of the JOG buttons allows frame to frame movement.

Still and slow motion playback are released after about five minutes to prevent damage on the tape.

■ Winding on and rewinding

When in stop mode, you can press the FF or REW button to fast forward or rewind the tape.

If, while playing a tape and you press the FF or REW buttons, the VCR will go into search mode. For high speed search, press and hold the FF or REW button for about 1 second before releasing. Pressing the button again or the PLAY button resumes playback.

■ Automatic rewind mechanism

When the tape runs out in record, playback, fast forward or forward search modes, it is automatically rewound. When the tape runs out in blank search, one touch recording, programmed recording, search by time or index search the tape stops.

During special playback the sound is muted. Depending on tapes and the types of TV sets used, the picture may roll up and down, noise may be present and the colour may disappear.

The horizontal noise bars which appear during fast playback, slow motion playback and reverse playback can be adjusted horizontally. To do this, press the CHANNEL ▲ or ▼ button on the VCR whilst viewing the noise bars.

■ Colour coordinated displays and buttons

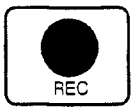
For controlling the on screen menus, the remote control buttons and the menus are equivalently coloured. The hints in the menus are shown in a colour which is the same colour as the buttons you must use. The colours that are used are as follows:

GREEN = VIDEO MENU/Settings

BLUE = ShowView programming

MAGENTA = One key programming

ENGLISH



Recording

The programming menu of this VCR allows you to record up to 8 programmes in the course of a month. In addition it provides different ways of direct recording.

Record button

You can start recording without pre-programming by means of the REC button.

Tape speed

In all recording modes you have the choice of either Standard Play (SP) or Long Play (LP). LP means half speed and allows you to record for up to 8 hours on a four hour cassette (E-240). LP cannot be played back on a VCR which only has standard play (SP). Using LP recordings may slightly reduce your picture quality. Select LP or SP by pressing the SP/LP button.

Recording one programme whilst watching another

If you want to watch one programme on the TV whilst recording another, select the channel you want to watch by pressing the appropriate channel button on your TV. On the VCR, select the channel you wish to record and start recording by pressing the REC button. To check the recording programme, select the video channel on your TV.

PDC programming

PDC is a Programme Delivery Control system. TV stations which use this system, transmit PDC codes with each programme. Instead of the VCR following the instructions you have entered for recording a programme i.e. channel, date, start time and end time, by selecting PDC, the VCR will look for signals which are transmitted with the programme when it is broadcasted. By means of the PDC function you can ensure that a recording will be completed even if it is broadcast earlier or later than planned or if it lasts longer than originally announced (i.e. football match going into extra time).

PDC:
If there is an overlap in the transmission because of delays, the PDC controlled recordings take priority. If two PDC programmes overlap the VCR will record the programme which starts first.

It may happen, that the VCR does not recognize the PDC signals as they may be too weak, or the signal was not sent by the transmitter. In such a case, the VCR will start and finish at the times you programmed into the VCR. If while recording, the VCR receives and evaluates the PDC code, the VCR will switch over to recording in PDC mode, ensuring that the whole programme is recorded.

The VCR enters PDC stand-by at 8 pm on the day before the programmed recording. If the programme is not broadcast at the expected time, the VCR remains on stand-by until 4 o'clock the next morning after the programmed recording was due to be broadcast. While the VCR is on stand-by for PDC recording, it cannot be used in any other modes. To be able to use the VCR, press the POWER button. This will not erase any PDC programme.

The PDC mode is indicated on the programme list display with a small "p". If the transmission has no PDC facility you must select "t" for timer (normal recording). In this case, the VCR will follow the time you have programmed only.

The PDC system may not be available on all your TV stations. Only some stations may transmit PDC codes along with the programmes. If you find that your VCR has stopped recording before the actual end of the programme, this may be due to the broadcasting station not transmitting PDC codes.

External appliances

If you wish to record from external sources, select channel L1 or L2 on the VCR's fluorescent display and then press the REC button.

Recording

REC

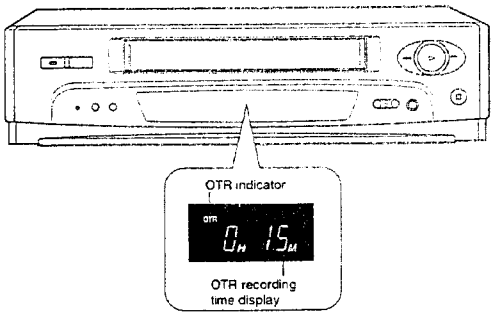
■ One touch recording (REC/OTR)

You can also record by using the REC/OTR button. The REC/OTR function is a quick and simple way to record programmes while only having to specify a length of time required for the recording. To use this function, proceed as follows:

1. Load your cassette and select the channel you wish to record. Remember to select the desired tape speed.

2. Press the REC/OTR button. Recording will now begin. Each further press of the REC/OTR will increase the recording time by 15 minutes. This is shown on the fluorescent display of the VCR. You can record up to four hours or until the end of the tape by this means. You can interrupt the recording with the PAUSE button or stop the recording with the STOP button.

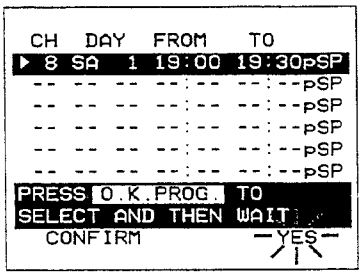
You can change the recording time during recording, by repeatedly pressing the REC/OTR button.



■ One key programming (O.K.PROG.)

By using the O.K.PROG. button you can easily set the timer with only one button.

One press of the O.K.PROG. button gives you the programme list display. Wait until two dashes (- -) flash under "CH". Keep pressing the O.K.PROG. button until the channel number you want is shown. Wait about four seconds. After that the dashes below "DAY" will flash. Again press the O.K.PROG. button until the day you want is shown. Wait another four seconds and enter the start time and finish time of the recording. At the end of the programme line it will have a "pSP". The "p" indicates PDC programming. The "SP" indicates standard play. These settings can also be changed.



After you have set the tape speed, the query "CONFIRM" will appear in the lower part of the menu. Check that the settings are correct. If they are, press the O.K.PROG. button to select the CONFIRM to YES. After four seconds the VCR switches itself off and shows by means of a symbol ⏍ on the VCR's fluorescent display that the VCR is in programme recording stand-by mode.

If you choose NO in the last step of "CONFIRM", the cursor will return to the beginning of the line you have just entered and goes through the procedure item by item. Now you can change individual settings by means of the O.K.PROG. button

You can speed up this process by using the JOG and SHUTTLE buttons. With the SHUTTLE buttons you move the flashing area. You can change the settings in any direction with the JOG buttons.

You can quit the programme list display by pressing the MENU button.

If you did not complete the confirmation part of the programming process, the VCR will not go into stand-by until the POWER button is pressed.

ENGLISH

Recording

Should you wish to programme for several recordings, after choosing the tape speed of your first programme, press the NEXT button to select the next programme line. Continue to enter and repeat the process for all desired recordings. Only when you have completed all the required programming do you set the CONFIRM to YES.

You can set the VCR to record Everyday, Weekly or from Monday to Friday. Press the O.K.PROG. button until:

Everyday recording	[E-DAY]
Weekly recording	[E-WE](The 'WE' is for every Wednesday)
Monday to Friday recording	[MO-FR]

If you press the DATA ON SCREEN button while setting the programming menus, the black screen will be replaced by the TV picture overlaid with the programming details.

If you press the POWER button, you will put the VCR into stand-by mode and therefore you cannot use the VCR unless you press the POWER button once on the remote control or twice on the VCR.

Pressing the POWER button on the VCR once will turn the programmed recording indicator off along with the VCR's power.

To return to the TV programme after you have entered your programming details, press the MENU button. The VCR will go into stand-by mode for recording after you press the POWER button.

After you have finished programming, you can check or alter the settings at any time on the programme list display. Ensure the VCR is switched on and then press the O.K.PROG. button. The programme list display appears.

You can delete a complete line with the CANCEL button or press the SHUTTLE ◄ button when the channel number is flashing.

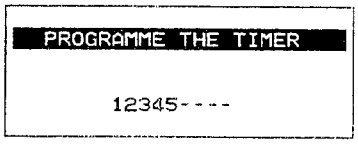
■ ShowView programming

ShowView programming allows you to programme without entering a channel number, date, start and finish times. Instead you enter a number of up to a maximum of nine digits.

Please remember that use of the ShowView Programming System will only function after you have entered the Guide Channel Numbers. (See page 12 for 'Setting for ShowView Programming'.)

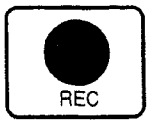
Proceed as follows:

1. Press the SHOWVIEW button.
2. Enter the ShowView number using the number buttons.



Press the CANCEL button if you have entered the ShowView number incorrectly.

3. For one recording, press the SHOWVIEW button. (The TV screen switches to the programme list display.)
4. Repeat steps 1 to 3 for other recordings.



5. Press the MENU button to quit.

6. Press the POWER button and confirm that the programmed recording indicator ⏲ has illuminated on the fluorescent display. Now the VCR will go into stand-by mode for programmed recording.

The following error messages will appear to inform you that something is wrong.

"ERROR" - An invalid number has been entered. Re-enter the correct number.
"OVERLAP ERROR" - The entry you have just made overlaps with one already present and therefore it will not be entered into the memory for recording.

After you have entered the ShowView numbers and pressed the SHOWVIEW button, the numbers will be converted into the programme's data and will be displayed on the TV screen. The minutes of the 'TO' will flash and you can change this by using the JOG buttons. If you want to change the hour setting, press the SHUTTLE ◀◀ button. You can now adjust the finish time, by pressing the JOG buttons.

A. Monday to Friday recording with ShowView

After entering your ShowView number and then press the DAILY/WEEKLY button until "DAILY" appears on the display, now press the SHOWVIEW button. ([MO-FR] is displayed on the "DAY" setting of the programme list display.)

B. Weekly recording with ShowView

After entering your ShowView number, press the DAILY/WEEKLY button until "WEEKLY" appears on the display, now press the SHOWVIEW button. ([E-] and the day of the week is displayed on the "DAY" setting of the programme list display. For example, [E-WE] will be displayed for weekly Wednesday recordings.)

ShowView numbers are unique therefore you must use the correct numbers as specified in the listing. For Monday to Friday and weekly recordings the ShowView number will operate 1 week prior to and 1 week after the scheduled broadcast date.

Normally the programme list display's default setting is the "p" setting. For programming with the timer programming, select the position with the SHUTTLE buttons and change the setting to a "t" by pressing the JOG ✚ key.

With ShowView programming you can programme your VCR up to minus two days from the current date. For example: if today is March the 9th, you can programme up to April the 7th for a TV broadcast.

■ Regular recording

In all timer modes you can record programmes which are broadcast regularly everyday (MO-FR) or every week. This facility is not limited to one month.

■ Programming 8 recordings

If you have already chosen six programmes on the programme list display, the instructions in the lower half of the menu will be replaced by lines 7 and 8.

If two TV programmes overlap in timer mode, recording begins at the earlier start time and then switches to the programme with the later start time.

ENGLISH

Recording

Automatic recording speed (AT)

This function records in SP mode, unless there is insufficient tape.
The recording will start in SP mode and the VCR will automatically switch to long play when the tape begins to run out.

Ensure that the TAPE LENGTH is set to the appropriate according to the tape being used.

Instead of selecting SP or LP on the programming list, set the tape speed to AT.

To ensure the programme is recorded completely, we recommend you extend the end time of the recording.

The AT function is only available for one programme line.

AT function is not available in OTR or PDC programming modes.

Recording coded TV programmes

When an appropriate decoder is connected to your VCR, it is possible to record coded TV programmes while watching them or while watching regular programmes. If you have connected the decoder by means of EURO AV connection cable, then you can record regular programmes while watching a coded programme. When tuning channels ensure the broadcast type is set to PAL D.

If you would like to record and watch a coded programme simultaneously, you must select the Video channel on your TV.

If the VCR is on and has a coded programme selected, you can only watch the coded programme on the Video channel. When the VCR is in stand-by mode for programmed recording, the decoded programme is available on the TV channels. When the VCR is switched on, the decoded programmes are only available on the Video channel.

Remember that if you have the PDC chosen for your programmed recording of a coded programme. The VCR will automatically switch to stand-by mode. It will not be possible to view the decoded programme on the TV channels.

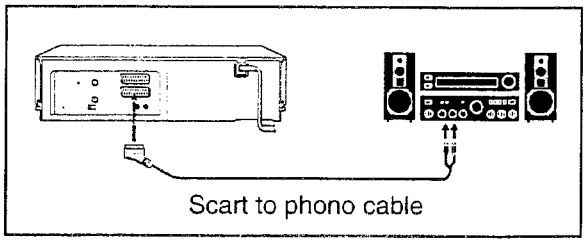
It is not possible to select an external input on the TV, while you are watching a coded programme and recording another programme.

Hi-Fi stereo recording

Your VCR is able to record Stereo TV programmes and 2-Channel (bilingual) language programmes.

With a Hi-Fi stereo connected to your VCR, you can record from other equipment, such as a CD player etc.

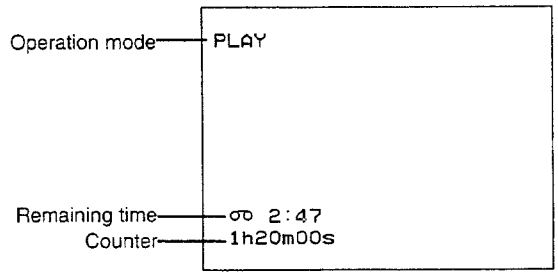
Set the programme input on your VCR according to the connection of your external equipment (e.g. L1 (EURO AV1 IN/OUT), L2 (DECODER/EURO AV2 IN). (See below.)



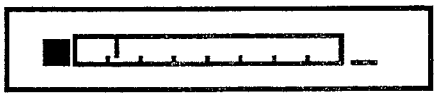
Playback

On screen display

To assist you the VCR can display information for a short time on the TV screen. Further information can be displayed by pressing the DATA ON SCREEN button.



To show the present time, press the DATA ON SCREEN button twice. The remaining time is replaced by the present time. While rewinding or fast forwarding, the approximate tape position will be shown in a bar.



Depending on the type of tape used, the remaining time and the tape position displayed may not function correctly. The remaining time display and the tape position display work with only recorded tapes and when recording. It does not work on unrecorded tapes.

The remaining time display is not available when playing back an NTSC recorded tape.

Tape length setting

To ensure the remaining time and tape position shown in the display are nearly accurate, you must set the TAPE LENGTH from the VCR MENU according to the length of the tape being used. (Select E-180 for tapes which are 195 minutes long or less, and E-240 for tapes which are 210 or 240 minutes long.)

E-180	E-30 E-60 E-90 E-120 E-150 E-165 E-180 E-195
E-240	E-210 E-240

Playing from marked positions (Index signals)

At the beginning of every recording a mark or "index signal" is inserted. You can manually insert index signals by pressing the REC button on the remote control while recording and during playback (ensure that the protective tab is intact). Index signals should be separated by at least one minute. "INDEX WRITE" appears on the TV screen.

In order to search for the first index signal, press the INDEX button once when in stop mode. By each press of the button you increase the number and can thus choose up to 19 marked points (+19). The VCR will then wind to the desired signal and start playing. If the required index signal is backwards from the starting point, press the INDEX button.

In the same way up to 19 index signals can be preselected (e.g. -19). On screen you will see displayed "SEARCH +" or "SEARCH -".

The index number will decrease by 1 with every index mark found.

If you want to end the search press the PLAY or the STOP button.

Erasing index signals

To erase an index signal from a tape, press the CANCEL button during playback just before reaching the point at where the index signal is on the tape. "INDEX ERASE" appears on the TV screen.

ENGLISH

Playback

■ Forward to blank space and stop

Convenient for rapidly locating the end of a recording on a tape. The VCR will wind the tape forward and stop when the end of the recording has been reached. Choose FF TO BLANK PORTION from the VCR MENU and use the SHUTTLE ▶▶ button to activate the function. "BLANK SEARCH" appears on the TV screen.

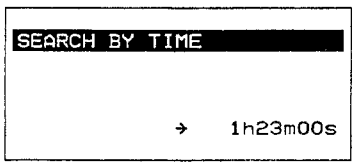
Blank portion search may not function correctly on some tapes.

■ Time search

This function allows you to specify the searching time with reference to the start of the tape.

1. Choose SEARCH BY TIME from the VCR MENU.

2. Set the desired time you require by using the numeric keys.



The VCR will automatically rewind to the beginning of the tape where it will reset the counter display and will then wind until it reaches your specified time where it will playback automatically.

If the COUNTER RESET button have been pressed before time search is activated, the VCR will locate the point by the counter number specified from the current position of the tape.

■ Replay function

If you press the ENCORE key during playback, the VCR will replay the last 5 seconds.

■ NTSC playback (on PAL TV)

To play a tape recorded with the NTSC system, use the VCR as if it were a standard PAL tape. No adjustments or switches are necessary. The following notes concern playback of NTSC tapes.

Depending on the type of TV set used, the picture may shrink vertically and black bars may appear at the top and bottom of the screen. This is not an indication of a malfunction.

The playback picture may roll up and down. If the TV set is equipped with a V-HOLD control, it may be possible to stop the picture movement by adjusting this control. However, a TV not equipped with a V-HOLD control cannot rectify this condition.

During special playback, the picture may not be in colour.

This function is designed only to allow the playback of tapes recorded in the NTSC format on a PAL system TV. The NTSC signal is not completely converted to a PAL signal. For this reason, images played back by this function cannot be recorded on another VCR.

Advanced features

Your new Mitsubishi VCR offers you a wide range of facilities. The additional functions are for your satisfaction and are mentioned at the end of the instructions to make you familiar with the many extra refinements your VCR offers.

■ Tape optimizer

The tape optimizer which is on the INITIAL SET-UP menu, is a tape measuring function, which can be utilised in both playback and record mode.

During playback the signal level of the tape is checked and the picture is adjusted accordingly. A good quality tape will be given more sharpness and detail. A poor quality tape will be played back with less sharpness to reduce the picture noise.

During recording, the record signals are adjusted to the best possible level according to the tape quality.

The tape optimizer function may not work correctly if there is no video signal present at the start of the recording.

Since the tape optimizer function takes approximately 1-2 seconds to distinguish the grade of each tape, you can leave this feature switched on at all times.

You can turn the tape optimizer ON or OFF by means of the SHUTTLE button, the "TAPE OPTIMIZER" is located on the INITIAL SET-UP menu.

■ Rental tape playback

This feature is designed to help when watching Rental Tapes. When a tape is inserted it will automatically search for the beginning of the recording, play until the end of the recording, then rewind and eject the tape. Simply press the RENTAL PB key (the RENT PB indicator illuminates on the fluorescent display) and insert a pre-recorded cassette with the protective tab removed. The VCR will then function automatically as follows:

RENT PB

1. Rewind to the start. (The counter will reset to 0H00M00S.)
2. Search to the beginning of the first sound track.
3. Play until the end of the programme.
4. Rewind to the start.
5. Eject and switch off the VCR.

You can end this function at any time by pressing the RENTAL PB button once more.

Rental tape playback functions on all cassettes where the safety tab has been removed.

It is possible that the VCR may not correctly locate the start of the soundtrack.

In connection with the Parental lock (see page 24), this function is ideal for minimising the viewing of videos from your children.

■ Beep sound

Your VCR is delivered with the Signal tone (beep) switched on.

One beep will sound when:

- the POWER is switched on.
- you change channels.
- on screen menus appear and disappear.
- switching RENTAL PB on or off.
- each time you enter a digit for ShowView programming.

Seven beeps will sound as a warning when:

- if you try to record on a record protected cassette.
- when recording, the tape will run out in 5 minutes.
- in timer record mode when no cassette has been inserted or a record protected cassette is inserted.
- you have input an incorrect ShowView number.

You can turn the signal/warning tone ON or OFF by means of the SHUTTLE button, the "BEEP SOUND" is located on the INITIAL SET-UP menu.

ENGLISH

Advanced features

ENGLISH

■ Parental lock (LOCK)

This device helps to provide deliberate limitation on children's viewing and prevents unwanted use of the VCR. Switching on or off is done by the DATA ON SCREEN key, which you keep depressed for about 10 seconds, until the LOCK indicator on the VCR's fluorescent display either comes on or goes off. This function can also be activated in playback mode. In this case, the keys on the VCR and the remote control will not operate.

LOCK

■ Memory backup in case of power failure

This VCR is equipped with a memory backup in the event of a power failure. The VCR automatically fully charged provided that the mains lead has been plugged in for at least an hour. In the event of a power failure, your programmed recordings and time display will remain intact for up to an hour, even if the mains plug is disconnected.

■ Automatic digital tracking (DTR)

DTR evens out the position of the tracking of video cassettes at the start of and during playback. Initially the "DTR" indicator flashes on the fluorescent display until optimal tracking has been achieved. While the tracking is being adjusted there may be some brief interference to the picture and sound.

DTR

If the DTR does not accomplish its task, manual operation is also possible. During playback press the CHANNEL ▲ or ▼ button on the VCR until the tracking is in order and interference is at a minimum. Manual adjustment will go off if you press the CHANNEL ▲ and ▼ buttons on the VCR at the same time.

■ Switching to other colour systems

Your VCR is set to the PAL colour system. To play a tape recorded in MESECAM the COLOUR SYSTEM is changed as follows:

1. Choose COLOUR SYSTEM on the VCR MENU.

2. Switch to MESECAM by means of SHUTTLE button.

This set is for exclusive use with the PAL colour system (system B&G). Please use only PAL pre-recorded cassettes which have been recorded with the PAL-VHS system.

SECAM (system B&G) colour programmes can be recorded in certain areas but there is no interchangeability of these recorded cassettes with other PAL-VHS recorders or SECAM-VHS recorders. Please use the exclusive SECAM-VHS recorder in French SECAM broadcasting areas.

■ Blue background

Your VCR is factory set with the BLUE SCREEN operating. This setting offers a more pleasant appearance under certain conditions, e.g.:

- you select a channel with a weak signal.
- the channel you have selected is not broadcasting.
- the input signal is switched to an external source without any external signals coming in.
- when the video heads need cleaning (bad playback signals).
- if the VCR is not tuned into a station correctly.

This function can be turned off (e.g. if you want to watch a programme with a weak signal):

Choose BLUE SCREEN on the INITIAL SET-UP menu and turn it to OFF by means of the SHUTTLE button.

■ Quick look

This feature is useful for when you are rewinding or fast forwarding a tape and you wish to check the position you are at on the tape without having to stop the tape.

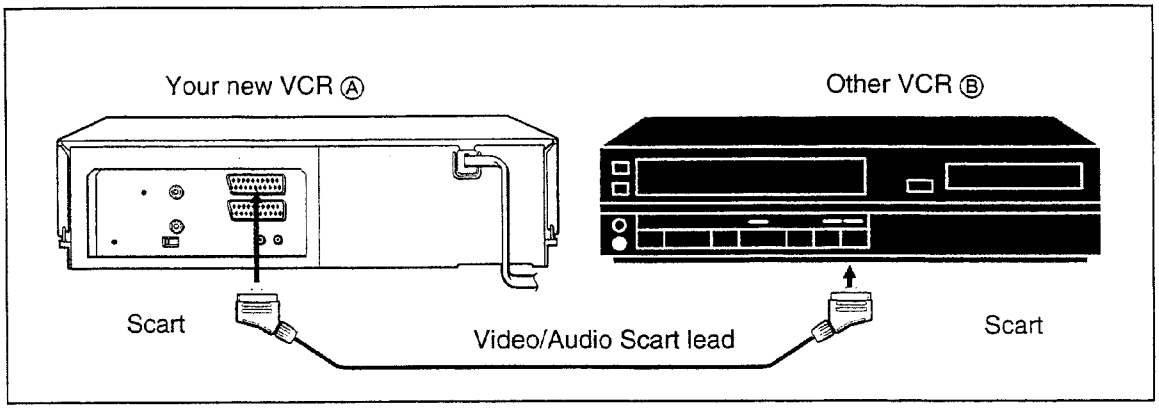
1. In fast forward press and hold the FF button.

2. Release the FF button to resume fast forwarding.

This function operates exactly the same for rewinding. (Follow the same procedure above but use the REW button.)

Advanced features

■ Copying with two VCR's



Link both VCR's by means of a Scart lead as shown in the diagram. Connect the DECODER/EURO AV2 IN of recorder Ⓐ to EURO AV IN/OUT or to RCA AUDIO/VIDEO OUT of recorder Ⓑ. If the second VCR Ⓑ has no Scart socket but has an RCA AUDIO/VIDEO output then use a corresponding adapter cable. In this example your Mitsubishi VCR Ⓐ is being used as the recording device.

1. On the remote control press the JOG ■ button until the external channel L2 (DECODER/EURO AV2 IN) shows on the Mitsubishi VCR.

2. Start playing on the other VCR Ⓑ, then press the REC button on the Mitsubishi Ⓐ.

An external channel must not be selected on the playback VCR especially when the recording VCR is connected via a Scart cable. Ensure the VCR used as source is set to the tuner position and not to an external input.

Ensure that the COLOUR SYSTEM is set correctly (PAL or MESECAM). (An "m" will appear to the right of the external channel displayed to indicate the colour system is set to MESECAM.

The data on screen will be recorded together with the signal from the playback VCR.

If you have used a 21 Pin Video/Audio Scart connector, please remember to remove it after copying as it interferes with normal operation.

Tapes recorded in the NTSC format cannot be copied to another VCR from your new VCR.

Tip: If you want to have a permanent connection between two VCR's, it is best to use a special Copying lead (7 pin Scart cable).

Alternatively you can connect your new VCR up to record from other equipment:

- Stereo system
- A satellite receiver
- Video camera

Most connections are made by using the Euro AV sockets at the rear of this VCR. (For further information on connections, see page 8.)

■ Editing control

This feature is ideal for edit commercials while recording.

1. During recording, press the PAUSE button. By using the SHUTTLE buttons, position the tape at the beginning of the commercial. Press the PAUSE button again when the commercials are finished to commence recording.

2. If you release the PAUSE button too early, then simply press the REW button within 8 seconds. The tape will be rewound to the exact point where you had released the PAUSE button. You can start recording at this point.

ENGLISH

Advanced features

Stereo and dual soundtracks

This VCR operates in stereo, dual channel and mono with both NICAM and A2 system and will select the appropriate system automatically.

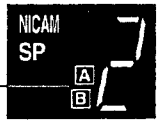
Soundtrack indicators

NICAM stereo:

NICAM & stereo indicators

NICAM dual:

NICAM A and B indicators



NICAM mono:

NICAM A indicator

A2 stereo:

Stereo indicator

A2 dual:

2 CH indicator

Mono:

No indicators

The VCR may take a few seconds to receive the NICAM or A2 signal. If the signal strength is weak, the VCR may not be able to identify the signal correctly. This can be seen by observing the fluorescent display indicators. The relevant indicator may switch on and off or be permanently off.
In this case, you may wish to switch off the stereo sound by selecting the NICAM/A2 to OFF from the VCR MENU by using the SHUTTLE button.

If you have set the NICAM/A2 to OFF, then the 2 channel signals will not be recorded, but only a mono sound. Set the NICAM/A2 to AUTO in case the broadcast signal improves.

Soundtrack selection

To select a different soundtrack, press the MONITOR button.

The soundtracks that you will hear are shown in the diagram below:

	STEREO L R	L L	R R	NORMAL
NICAM stereo programme	Stereo (Left channel, Right channel)	Left channel	Right channel	Standard audio
NICAM dual programme	Channel A	Channel A	Channel B	Standard audio
NICAM mono programme	Channel A	Channel A	Channel A	Standard audio
A2 Stereo programme	Stereo (Left channel, Right channel)	Left channel	Right channel	Monaural
A2 dual programme	Main, Sub	Main	Sub	Main

Switching through the soundtracks during recording has no effect on the soundtracks recorded.

If you connect your VCR to your TV using the coaxial cable (supplied), you will not be able to hear stereo and 2CH sounds. To hear a stereo soundtrack during playback, ensure the TV is connected to the VCR by means of the EURO AV scart connection or the AUDIO OUT (Left and Right) sockets.

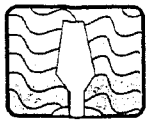
Continuity between recordings

Your VCR has the facility to achieve frame to frame continuous recordings.

1. Start PLAY and press the PAUSE button.
2. With the SHUTTLE buttons find the desired starting point and then press the PAUSE button. You can now adjust it if necessary by means of the JOG buttons. The new recording will then start exactly at the designated point.
3. Press the REC button and the VCR will be in record pause mode.
4. Press the PAUSE button to end the pause mode and to start the recording.

ENGLISH

Troubleshooting



Troubleshooting and error elimination

If the machine does not follow your commands, there may not necessarily be a serious fault. First of all go through the checklist below and see if the problem is due to a simple cause.

Fault	Action
Power not supplied to your VCR.	Remove the plug and check the cable.
VCR power is ON but the VCR is not operating.	Is the LOCK indicator ON, if so, press and hold the DATA ON SCREEN button for approximately 10 seconds. The LOCK indicator should disappear. If the LOCK indicator was not activated, press the TIMER RESET button.
Nonsense information appears in the fluorescent display.	Press the TIMER RESET button on the rear of the VCR. Remember that the language selection, clock setting and all timer programmes for recording will be lost.
The CLOCK SET display appears when pressing the O.K.PROG. button.	The clock and date have not been set, refer to page 13 'Setting the clock, clock control' and then proceed with programming using the O.K.PROG. button.
The VCR does not operate when the REC button is pressed.	Check the cassette has the erasure protection tab intact. Check there is tape remaining. Is the LOCK indicator ON?
There is no picture during playback or recording.	Ensure the video channel is selected on your TV. Is the RF OUT switch in the ON position?
The programme list display appears instead of the ShowView when the SHOWVIEW button is pressed.	If eight programmes have already been programmed, the display for ShowView programming will not appear.
The programmed recording indicator ⏺ and the cassette status indicator ⏏ flashes (and the tape is automatically ejected) when the VCR is set to stand-by mode for programmed recording.	You have forgotten to install a tape or you have installed a tape with the erasure tab removed. Press the POWER button on the remote control once or the POWER button on the VCR twice. You can now install a tape with the erasure tab intact and press the POWER button and confirm the programmed recording indicator ⏺ is illuminated.
Picture on replay is rather noisy.	Make sure that the automatic tracking is set. Correct manually if necessary.
The VCR does not record from any stations.	Check that the VCR's selected channel is the correct one and that you can get a good picture for viewing.
No operation when the buttons on the remote control are pressed.	Have the batteries run low? Is the LOCK indicator ON?
No Hi-Fi sound is played back or the Hi-Fi sound at playback is interrupted.	Clean the video heads using a dry-type video head cleaning cassette. Do not use a wet-type cleaning cassette, as it may damage your VCR. Excessive use of a cleaning cassette could shorten head life. Be sure to follow the cleaning instructions carefully. If you can not solve the problem, please contact your dealer.
Video cassette automatically unloads.	Ensure you not trying to record on a cassette with the erasure tab removed.

This list of faults will not help you in all cases. If a serious problem develops, please contact your dealer.

ENGLISH

Key words

A — **Pages**
Accessories ..... FI
Automatic recording speed (AT) 20
Automatic rewind mechanism 15
AV input 8

B
Bar 21
Beep 23
Blue background 24

C
CANCEL button ..... FI
Channel number 11
Clock set 13
Colour systems 24
Continuity between recordings 26
Copying 25
Copying lead (7 pin Scart cable) 25

D
DAILY/WEEKLY button ..... FI, 19
Damage to the tape 14
DATA ON SCREEN key ..... FI
Digital tracking (DTR) 24

E
Editing commercials 25
Eject ..... FI
Erase protection 14
Euro AV Scart sockets ..... FI
Everyday recording 18

F
Fine tuning 11
Fluorescent Display ..... FI
Frame advance 15

H
Head cleaning (built in) 14
Hi-Fi stereo recording 20

I
Index signals 21
Input sockets ..... FI
Interference 9

J
JOG keys ..... FI

L
Language menu 10
Long Play (LP) 16

M
Memory backup 24
MENU button ..... FI
MESECAM 24

N — **Pages**
NEXT button 18
NTSC playback (on PAL TV) 22
Numeric keys ..... FI, 11

O
Off air recording 14
On screen information 21
One key programming (O.K.PROG.) .. 17
One touch recording (REC/OTR) 17

P
PAL colour system 24
Parental lock (LOCK) 24
PAUSE button ..... FI, 14
PDC programming 16
Picture search 15
Picture search speed 15
Playback 15

R
Rearranging channels 10
REC/OTR button ..... FI, 17
Record button (REC) ..... FI, 14, 16
Record pause mode 14
Record protected cassette 14
Recording coded TV programmes 20
Regular recording 19
Remote ..... FI
RENT PB 23
Replay function 22
Rewinding (REW) ..... FI, 15
RF IN ..... FI, 8
RF OUT ..... FI, 8

S
Scart connections 8
Setting for ShowView Programming ... 12
ShowView programming 18
Skipping vacant channels 11
Slow motion 15
Standard Play (SP) 16
Still picture 15
STOP ..... FI, 15

T
Tape optimizer 23
Tape position indicator 21
Tape speed 16
TIMER RESET button ..... FI, 10
Tracking 24

V
Video channel adjusting screw 9
Video channel on the TV 9
Video/Audio Scart lead 25

W
Weekly recording 19

FI - Flap pages

ENGLISH

Technical data

Video system	VHS TAPE
Colour Standard	PAL, MESECAM
Audio system	Hi-Fi
Video heads	4 x DJ + 2 x Hi-Fi
Programme storage	60 + 2 externals
Tape speed	23.39 mm/Sec.(SP) 11.70 mm/Sec.(LP)
Number of recordable programmes per month	8 (daily/weekly)
Record/Playback time	300 Mins. with VHS E-300 cassette (SP) 600 Mins. with VHS E-300 (LP)
Rewind speed	x 200 (LP) (2 Mins. approx. with VHS E-180 cassette)
Scart sockets	2 (incl. 1 x TV decoder)
Mains disconnection time backup	60 Mins.
Power consumption	Approx. 32 Watts
Mains Voltage	230 Volts
Aerial Input	VHF Channel 2 - 12 UHF Channel 21 - 69 CATV X, Y, Z, Z+1, Z+2, S1 - S41 75 Ohm unbalanced IEC plug
Aerial Output	Channel 36 (selectable to Channel 32 - 40) 75 Ohm unbalanced IEC plug
VIDEO	
Input	0.5 to 2.0 Vp-p, 75 Ohm unbalanced 21 pin Scart socket
Output	1.0 Vp-p, 75 Ohm unbalanced 21 pin Scart socket
AUDIO	
Input	-8 dBs 10k Ohm unbalanced 21 pin Scart socket
Output	-6 dBs 1k Ohm unbalanced RCA type jack socket -6 dBs 1K Ohm unbalanced 21 pin Scart socket
Hi-Fi sound	
Frequency response	20Hz - 20KHz (Input -20dBs)
Dynamic range	better than 90 dB
Operating Temperature	5°C to 40°C
Operating Humidity	30% to 80%
Weight	5.4 kg
Dimensions	380 x 94 x 330 mm

The information regarding the weight and sizes are approximate values.

ENGLISH